Appendix A

Borehole Logs

MW-1B

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/07/20 11:09 **COMPLETED** 08/11/20 09:14
WELL LOCATION 559477.98 N 2264365.76 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4805.54 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING 28.99 ft / Elev 4776.55 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0							Casing Top Elev: 4807.72 (ft) Casing Type: 2-in PVC
	SS 1	83	18-12-15-23 (27)	CL		LEAN CLAY, SILTY, (CL) brown (10YR 4/3), dry, soft to stiff, non plastic, stiffness and plasticity increase gradually with depth, some gravel in top 6in	
	SS 2	100	23-27-28-23 (55)				
5	MC 3	100	4-5			5.0	
	SS 4	92	12-31-40-50 (71)			FAT CLAY, (CH) yellowish brown to brownish yellow (10YR 5/4), dry to moist, stiff, laminated, medium plasticity, trace sand, iron oxide staining, relict shale structure, iron staining and gypsum recrystallization along fractures and bedding planes, some high-angle to vertical fractures	
	SS 5	100	50			8.5 Sample collected for moisture & permeability	
10	SS 6	100	20-33-50 (83)	CH			Bentonite Chips, Hydrated in Lifts
	SS 7	100	22-50				
15	SS 8	100	50			15.0	
20	RC NX 9	40				SHALE, highly weathered, laminated, gray with yellowish brown (10YR 5/1), dry, iron oxide staining, clayey and weak along fractures and bedding planes, high angle to vertical fractures with iron staining and gypsum recrystallization	
25	RC NX 10	80					
30	RC NX 11	60				Sample collected for moisture & permeability 30.0	
35	RC NX 12	40				33.0	10-20 Silica Sand 0.010-in Slotted Screen

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35							
40	RC NX	80				SHALE, slightly weathered, laminated, black (N1), wet, iron oxide staining, weathered and iron-stained along bedding planes and fractures, some high angle to vertical fractures, light gray bentonitic clay zone at 38.5ft *(continued)*	
						40.0	
45	RC NX	100				SHALE, unweathered, laminated, black (N1), damp, bentonitic clayey zones and some mid-angle fractures	
						43.0	
50	RC NX	100				SHALE, unweathered, laminated, black (N1), dry, strong, two dry mid-angle fractures at 47.5ft and 51.5ft (slickensided), moist bentonitic clay zone at 55ft	
55	RC NX	100					Coated Bentonite Pellets
60	RC NX	90					
	RC NX	83					
65	RC NX	100					
						65.0	

Bottom of borehole at 65.0 feet.

MW-2B

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/11/20 12:35 **COMPLETED** 08/12/20 11:10
WELL LOCATION 560463.2 N 2264515.56 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4799.33 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING 16.06 ft / Elev 4783.27 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SS	75	5-5-5-5 (10)	CL		0.7 LEAN CLAY, SILTY, (CL) gray (10YR 5/1), dry, soft, non plastic, trace gravel, trace roots
	SS	75	5-7-12-15 (19)			LEAN CLAY, (CL) light yellowish brown to brown (10YR 6/4), dry to moist, stiff, low plasticity, relict shale structure, gypsum recrystallization on bedding planes and fractures
5	MC	83	17-33			Sample collected for moisture & permeability 5.0
	SS	100	9-10-50 (60)			
	SS	100	20-15-19-21 (34)	CL		
10	SS	100	3-9-14-15 (23)			
	SS	100	13-16-18-18 (34)			
15	SS	100	13-21-22-18 (43)			16.0
	SS	100	11-15-20-24 (35)	CL		LEAN CLAY, (CL) brown (10YR 5/3), moist, stiff, low plasticity, increasing shale fragments
20	SS	100	23-27-36-33 (63)			20.0
	MC	100	19-31			21.0 SHALE, highly weathered, laminated, very dark grayish brown (10YR 3/2), dripping to damp, iron oxide staining, heavily fractured, clayey with iron staining and gypsum recrystallization along bedding planes and fractures
	SS	100	21-27-25-29 (52)			Sample collected for moisture & permeability
25	SS	100	24-50			
	RC NX	45				
30						
	RC NX	100				
35						35.0

WELL DIAGRAM
Casing Top Elev: 4801.72 (ft)
Casing Type: 2-in PVC
Bentonite Chips, Hydrated in Lifts
10-20 Silica Sand
0.010-in Slotted Screen

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35	RC NX	100				SHALE, unweathered, laminated, black (N1), damp, iron oxide staining, fractured strong shale with iron staining on fractures, clayey zone at 37ft	
40	RC NX	100				40.0 SHALE, unweathered, laminated, black (N1), damp, fractured strong shale, wet along fractures but moist on fresh breaks	
45	RC NX	100					
50	RC NX	100				49.0 SHALE, unweathered, laminated, black (N1), dry, unfractured strong shale	
55	RC NX	93					Coated Bentonite Pellets
60	RC NX	96					
65	RC NX	93					
70	RC NX	140				Sample collected for moisture & permeability 70.0	

Bottom of borehole at 70.0 feet.

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/12/20 14:00 **COMPLETED** 08/13/20 14:46
WELL LOCATION 560238.51 N 2261884.78 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4826.41 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
▼ **AFTER DRILLING** 36.54 ft / Elev 4789.87 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0				CL		0.3 LEAN CLAY, SILTY, (CL) brown (7.5YR 5/2), dry, soft, non plastic, with roots	Casing Top Elev: 4826.41 (ft) Casing Type: 2-in PVC
	SS 1	67	1-3-3-5 (6)			LEAN CLAY, SILTY, (CL) light gray (10YR 7/2), dry, soft, non plastic, loess	
	SS 2	100	8-8-9-10 (17)	CL			
5	MC 3	63	11-23				
	SS 4	100	10-16-21-22 (37)			7.5	
	SS 5	100	8-7-12-14 (19)			LEAN CLAY, SILTY, (CL) light yellowish brown (10YR 6/4), dry to moist, medium stiff, low plasticity, trace fine to coarse sand, sand component increases with depth, gypsum crystals present	
10	SS 6	100	10-16-12-11 (28)	CL			
	SS 7	100	16-19-27-39 (46)			12.0 WELL GRADED SAND, SILTY, (SW) reddish brown (5YR 5/3), well graded, rounded, fine to coarse grained, dry to moist, dense, with gravel	
15	MC 8	100	50	SW		Sample collected for moisture & permeability	
						15.0	
						16.0	
	SS 9	0		GP		POORLY GRADED GRAVEL, SANDY, (GP) reddish brown (5YR 5/3), poorly graded, rounded, medium grained, moist, dense, with silt, logged from auger cuttings, sampler refusal due to gravel and cobbles	
	SS 10	100	38-28-50/3"			18.0 WELL GRADED SAND, SILTY, (SW) reddish brown (5YR 5/3), well graded, rounded, fine to coarse grained, moist, dense, with fine to coarse gravel, lens of SP fine light yellowish brown (10YR 6/4) sand at 22.5ft	Bentonite Chips, Hydrated in Lifts
20							
	SS 11	75	35-50				
	SS 12	50	8	SW			
25						25.5	
	SS 13	100	9-7-15-21 (22)			LEAN CLAY, (CL) yellowish brown (10YR 5/6), moist, medium stiff, medium plasticity, lens of wet fine sand at 36.5	
	SS 14	100	7-10-13-20 (23)				
30	SS 15	100	8-12-15-19 (27)	CL			
	SS 16	100	7-11-19-23 (30)				
	SS 17	100	8-14-17-17 (31)				
35							

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35	SS	100	7-8-16-16 (24)	CL		LEAN CLAY, (CL) yellowish brown (10YR 5/6), moist, medium stiff, medium plasticity, lens of wet fine sand at 36.5 *(continued)*	
	MC	75	10-20			Sample collected for moisture & permeability	
						38.0	
						FAT CLAY, (CH) yellowish brown (10YR 5/6), wet, medium stiff, high plasticity, lenses of wet sandy clay, gypsum present, some subrounded coarse sand in clay at 54-56.6ft	
						39.0	
40	SS	100	5-8-11-15 (19)				
	SS	100	5-7-9-12 (16)				
45	SS	100	5-9-9-11 (18)				
	SS	100	3-6-9-12 (15)				
	SS	100	4-5-8-9 (13)	CH			10-20 Silica Sand
50	SS	100	6-7-11-16 (18)				0.010-in Slotted Screen
55	RC NX	88					
	RC NX	90				56.5	
						SHALE, highly weathered, laminated, very dark grayish brown (10YR 3/2), damp, iron oxide staining, weak, clayey, fractured (including vertical fractures) with iron staining on fractures and bedding planes	
						57.5	
60						SHALE, slightly weathered, laminated, very dark greenish gray (10GY 3/1), damp, iron oxide staining, weak, no mid- to high-angle fractures, iron staining and pyrite on bedding planes	
	RC NX	100				60.0	
65						SHALE, unweathered, laminated, black (7.5YR 2.5/1), damp, medium-strong, no mid- or high-angle fractures (bedding plane only)	
	RC NX	100					
70						69.5	
	RC NX	100				SHALE, unweathered, laminated, black (7.5YR 2.5/1), dry, strong, unfractured	Coated
75							

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
75							
80	RC NX	100				SHALE, unweathered, laminated, black (7.5YR 2.5/1), dry, strong, unfractured *(continued)*	Bentonite Pellets
85	RC NX	100					
90	RC NX	100				Sample collected for moisture & permeability	
					90.0	Bottom of borehole at 90.0 feet.	

Boring Log

Project Name	Project No.	Drilling Company
Xcel CCR	10063857	Site Services Drilling, LLC

Boring No.	Location	Drilling Rig Type and Drilling Method
MW-5	Comanche Station	CME-55 Hollow Stem Auger (6-inch diameter)

Sample No.	Blow Count	Depth (feet)	Description (USCS)	Elevation (feet)	Remarks
			(0 - 8') Dry SILT 2.5Y 5/2		Potholed to 8 ft
		5			
			(8 - 9') Poorly graded fine SAND, very dry 5 YR 4/2		
			(9 - 14') Compacted SILT with white calcite laminates, very dry, stiff 7.5YR 6/3		4' of recovery from 8 - 14' core
		10			
			(14 - 22') Compacted SILT with trace white calcite laminates, very dry, stiff 7.5YR 5/4		
		15			
		20			
			(22 - 24') Compacted SILT with increased calcite content and trace dark gray SILT laminae 7.5 YR 3/2		
			(24 - 29') Highly weathered SHALE bedrock 2.5Y 3/2		
		25			
			(29 - 36') Weathered SHALE bedrock		
		30			Well Construction: Screen 16 - 26' Sump 26 - 36'
		35			

Total Depth (feet)	Water Level (feet)		Logged/Sampled By:	Drilled By:
	After Drilling:	Hours After:	M. Violette	Site Services Drilling, LLC
36	-		Date Started: 8/8/2017	Date Completed: 8/8/2017

Boring Log

Project Name	Project No.	Drilling Company
Xcel CCR	10063857	Site Services Drilling, LLC

Boring No.	Location	Drilling Rig Type and Drilling Method
MW-6	Comanche Station	CME-55 Hollow Stem Auger (6-inch diameter)

Sample No.	Blow Count	Depth (feet)	Description (USCS)	Elevation (feet)	Remarks
			(0 - 8') Dry SILT 2.5Y 5/2		Potholed to 8 ft
		5			
			(8 - 9') SAND with brittle SILT with white CLAY pieces 2.5Y 6/4		
			(9 - 12') SILT with SAND, brittle, very dry 7.5YR 5/4		
		10			
			(12 - 14') Well graded coarse SAND with GRAVEL, very dry, hematite and quartz present 5YR 5/6		
			(14 - 19') Coarse SAND with GRAVEL, large cobbles up to 3-inches in length, hematite and quartz present, very dry 5YR 5/6		2' of recovery from 14 - 19' core
		15			
			(19 - 23') Coarse SAND with GRAVEL, large cobbles up to 2-inches in length, moist 2.5YR 5/4		2.5' of recovery from 19 - 24' core
		20			
			(23 - 24') Same as above, 7.5YR 7/1		
			(24 - 29') Coarse GRAVEL with SAND. A 4-inch layer of brown CLAY at 27', some black SHALE pieces and cobbles up to 1-inch in length, micaceous 7.5R 5/4		2.5' of recovery from 24 - 29' core
		25			
			(29 - 30.5') SILT with GRAVEL, medium to coarse SAND present, moist 7.5YR 6/4		
		30			Well Construction:
			(30.5 - 31.5') Medium SAND with SILT 7.5YR 5/6		Screen 27 - 37'
			(31.5 - 33') CLAY with SILT 7.5YR 5/4		Sump 37 - 42'
			(33 - 34') Medium to coarse SAND, moist to wet 7.5YR 5/4		
			(34 - 35') CLAY with some SILT, firm, dry 7.5YR 5/3		
		35	(35 - 42') Highly weathered SHALE bedrock, trace SILT 10YR 4/2		

Total Depth (feet)	Water Level (feet)		Logged/Sampled By:	Drilled By:
	After Drilling:	Hours After:	M. Violette	Site Services Drilling, LLC
42	28'	21	Date Started: 8/7/2017	Date Completed: 8/7/2017

W-2A

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/03/20 10:36 **COMPLETED** 08/04/20 08:01
WELL LOCATION 561935.18 N 2267068.03 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4825.65 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
▼ **AFTER DRILLING** 24.81 ft / Elev 4800.84 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				ML		0.8 SILT, (ML) very dark brown (10YR 2/2), dry, soft, non plastic, some fine to medium sand
				CL		LEAN CLAY, SILTY, (CL) light yellowish brown (10YR 6/4), dry, soft to medium stiff, low plasticity, trace fine sand
5						5.5
				CL		6.0 LEAN CLAY, SILTY, (CL) very light brown (10YR 7/4), dry, medium stiff, low plasticity, with fine to coarse sand
				CL		LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist to dry, soft to stiff, laminated, medium plasticity, iron oxide staining, stiffness increases with depth; shale-derived clay
10						11.0
	Not Sampled			CL		LEAN CLAY, (CL) yellowish brown to yellow (10YR 5/4), moist, stiff, laminated, medium plasticity, iron oxide staining, shale-derived clay
15						
20						20.0
						SHALE, highly weathered, laminated, gray (N5), gypsiferous, damp, iron oxide staining, highly fractured, weak
						23.0
25						SHALE, highly weathered, laminated, gray (N5), gypsiferous, damp to wet, iron oxide staining, increasing fractures, iron staining, gypsum recrystalization with depth
						25.0 ▼
						SHALE, slightly weathered, laminated, black (N1), damp to wet, iron oxide staining, medium-strong
30						
						33.5

WELL DIAGRAM

Casing Top Elev: 4827.86 (ft)
Casing Type: 2-in PVC

- Bentonite Chips, Hydrated in Lifts
- 10-20 Silica Sand
- 0.010-in Slotted Screen

Bottom of borehole at 33.5 feet.

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 07/30/20 12:35 **COMPLETED** 08/06/20 17:12
WELL LOCATION 561930.73 N 2267068.12 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4825.6 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
▼ **AFTER DRILLING** 37.15 ft / Elev 4788.45 ft Rising; Not Static
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0							Casing Top Elev: 4827.8 (ft) Casing Type: 2-in PVC
	SS 1	100	7-7-8-9 (15)	ML		0.8 SILT, (ML) very dark brown (10YR 2/2), dry, soft, non plastic, some fine to medium sand	
	SS 2	100	6-6-7-7 (13)	CL		LEAN CLAY, SILTY, (CL) light yellowish brown (10YR 6/4), dry, soft to medium stiff, low plasticity, trace fine sand	
5	SS 3	100	6-10-12-10 (22)			5.5	
	MC 4	75	3-5	CL		6.0 LEAN CLAY, SILTY, (CL) very light brown (10YR 7/4), dry, medium stiff, low plasticity, with fine to coarse sand 7.0	
				CL		LEAN CLAY, (CL) yellowish brown (10YR 5/4), moist to dry, soft to stiff, laminated, medium plasticity, iron oxide staining, stiffness increases with depth; shale-derived clay Sample collected for moisture & permeability	
10	SS 5	100	12-13-15-27 (28)				
	MC 6	75				Sample collected for moisture & permeability 11.0	
	RC NX 7	25				LEAN CLAY, (CL) yellowish brown to yellow (10YR 5/4), moist, stiff, laminated, medium plasticity, iron oxide staining, shale-derived clay	
15				CL			
	RC NX 8	70					
20						20.0	
	RC NX 9	100				SHALE, highly weathered, laminated, gray (N5), gypsiferous, damp, iron oxide staining, highly fractured, weak 23.0	
25						SHALE, highly weathered, laminated, gray (N5), gypsiferous, damp to wet, iron oxide staining, increasing fractures, iron staining, gypsum recrystalization with depth 25.0	
	RC NX 10	53				SHALE, slightly weathered, laminated, black (N1), damp to wet, iron oxide staining, medium-strong	Bentonite Chips, Hydrated in Lifts
30						Sample collected for moisture & permeability 29.0	
	RC NX 11	90					
35						34.0	

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35							
40	RC NX	100				SHALE, unweathered, laminated, very dark greenish gray (5GY 3/1), gypsum seams, bentonitic clay at 38 & 39', damp, unfractured *(continued)*	
						40.0	
45	RC NX	70				SHALE, unweathered, laminated, gray (N5), gypsum seams, bentonitic clay at 51', damp, unfractured	
						45.0	
50	RC NX	100				SHALE, unweathered, laminated, gray to black (N1), dry, unfractured	
55	RC NX	100					
60	RC NX	100					
65	RC NX	100					10-20 Silica Sand
	RC NX	100				Sample collected for moisture & permeability	0.010-in Slotted Screen
						65.0	
70	RC NX	100					
75						75.0	

Bottom of borehole at 75.0 feet.

Boring Log

Project Name	Project No.	Drilling Company
Xcel CCR	266180	HP Geotech

Boring No.	Location	Drilling Rig Type and Drilling Method
W-4	Comanche Power	CME-55 Hollow Stem Auger (8-inch borehole)

Sample No.	Blow Count	Depth (feet)	Description (USCS)	Remarks
1' below groung surface (bgs)	N/A		7.5YR 3/2; Sandy Silt (ML), some gravel; nonplastic; noncohesive; dry	Potholed to 8' on 11/9/2015
5' bgs	N/A	5	10YR 5/3; Lean Clay (CL); stiff, med-high plasticity; cohesive; moist	
W-4: 9' bgs 10' bgs	6-8 (Cal) 5-7-8 (SS)	10	10YR 4/3; Lean Clay (CL); stiff, low plasticity; cohesive; some lamination; moist	Fe staining. Cal sample at 9'bgs submitted for geotech analysis
			10YR 4/3; Lean Clay (CL); very stiff, low plasticity; cohesive; laminated; moist	Fe staining
14' bgs	6-7-12 (SS)	15	Alluvium/bedrock contact at 14'bgs	
			Dark gray Gley 1 4/N; Lean Clay (CL) Black Shale, weathered; laminated	Fe staining
19' bgs	11-15-21(SS)	20	As above	Fe staining; hard, very micaceous
24' bgs	10-18-28(SS)	25	Very dark gray Gley 1 3/N; Silt (ML); hard, non-plastic; non-cohesive; laminted; dry to moist	Fe staining; micaceous

Total Depth (feet)	Water Level (feet)		Logged By:	Drilled/Sampled By:
	After Drilling:	Hours After:	Date Started:	Date Completed:
25.5	14.11	24	11/10/2015	11/10/2015

Nick Hanrahan

Brent McDaniel

Boring Log

Project Name	Project No.	Drilling Company
Xcel CCR	266180	HP Geotech

Boring No.	Location	Drilling Rig Type and Drilling Method
W-5	Comanche Power	CME-55 Hollow Stem Auger (8-inch borehole)

Sample No.	Blow Count	Depth (feet)	Description (USCS)	Remarks
				Potholed to 8' on 11/9/2015
2' bgs	N/A		10YR 4/3; Fat Clay (CH) with Sand and some Gravel; high plasticity; cohesive; moist to wet (likely due to potholing)	
5' bgs	N/A	5	As above	
W-5: 9' bgs 10' bgs	5-7 (Cal) 5-7-8 (SS)	10	Brown 10YR 4/3; Lean Clay (CL), some gravel; stiff; medium plasticity; cohesive; dry to moist	Cal sample at 9' bgs submitted for geotech analysis
14' bgs 15' bgs	14-21 (Cal) 10-13-21(SS)	15	As above. Hit a layer of shale bedrock with quartz vein, became laminated to thinly bedded; hard	Fe staining; quartz vein visible
19' bgs	10-12-22(SS)	20	As above; laminated	Fe staining; gravel-size mic grains
24' bgs	9-11-13 (SS)	25	Brown 7.5YR 4/4; fine-medium Sandy Silt (ML); some coarse; very stiff; non-plastic; non-cohesive; moist	

Total Depth (feet)	Water Level (feet)		Logged By:	Drilled/Sampled By:
	After Drilling:	Hours After:	Nick Hanrahan	Brent McDaniel
25	Dry	24	Date Started: 11/9/2015	Date Completed: 11/9/2015

HDR, Inc.
9781 S Meridian Blvd, Suite 400
Englewood, CO 80112

W-5B

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 12/11/20 11:15 **COMPLETED** 12/14/20 13:00
WELL LOCATION 560800.98 N 2266452.74 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4807.99 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING 8.82 ft / Elev 4799.17 ft
NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				GC		0.2 CLAYEY GRAVEL (GC), yellowish brown (10YR 5/4), dense, moist, (Fill) 1.0
5	AU			CH		FAT CLAY (CH), brown (10YR 4/3) to yellowish brown (10YR 5/4), medium stiff, medium plasticity, moist, lenses of lean clay, trace sand and fine gravel, trace evaporites, iron staining (Colluvium) (W-5B-3-4)
10	CC	100				
15	CC	90				13.5 LEAN CLAY (CL), yellowish brown (10YR 5/6) interbedded with dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1), stiff to very stiff, low to medium plasticity, moist to wet at 15ft, relict shale structure, some gypsum in bedding planes (Colluvium) (W-5B-14-15)
20	CC	100		CL		
25	CC	100				
30	NX	48				29.0 SHALE, black (Gley 1 2.5/N) with brown (10YR 4/3) clay, highly weathered, weak, clayey, moist to wet, high-angle fractures with iron-staining and gypsum (Weathered Shale)
35	NX	37				34.0
	NX	100				35.5 SHALE, black (Gley 1 2.5/N) to very dark gray (2.5Y 3/1), slightly to moderately weathered, weak, clayey, moist to wet, some gypsum in bedding planes, no high angle fractures or iron staining (Weathered Shale)
						39.0 SHALE, black (Gley 1 2.5/N), unweathered, medium strong, moist to low moist, no fractures (except coring induced), no iron staining, some to trace gypsum deposits and mollusc fossils (Unweathered Shale)

WELL DIAGRAM

Casing Type: 2-in PVC

Bentonite Chips

0.010-in Slot

Bentonite Pellets

Bottom of borehole at 39.0 feet.

Boring Log

Project Name	Project No.	Drilling Company
Xcel CCR	266180	HP Geotech

Boring No.	Location	Drilling Rig Type and Drilling Method
W-6	Comanche Power	CME-55 Hollow Stem Auger (8-inch borehole diameter)

Sample No.	Blow Count	Depth (feet)	Description (USCS)	Remarks
1' below ground surface (bgs)	N/A		10YR 3/2; Silty Sand (SM) with Gravel; nonplastic; non-cohesive (Fill); moist	Potholed to 8' on 11/9/2015
5' bgs	N/A	5	10YR 3/2; Silt w/ Sand (ML); nonplastic, noncohesive; wet	
W-6: 9' bgs 10.5' bgs	8-11 (Cal) 5-8-10 (SS)	10	Olive brown 2.5Y 4/3; Lean Clay (CL); very stiff; medium to high plasticity; cohesive; moist to wet	Fe staining. Cal sample at 9' bgs submitted for geotech analysis
14' bgs	4-7-8 (SS)	15	Top 14": As above; stiff Bottom 6": Gray Gley 1 5/N; Silt (ML) with Shale; stiff; nonplastic; cohesive; moist	Fe staining. Alluvium; top of refusal
19' bgs	6-7-8 (SS)	20	Olive brown 2.5Y 4/3; Lean Clay (CL); stiff; medium plasticity, cohesive; moist	Fe staining; micaceous
24' bgs	15-20 (Cal)	25	Dark grayish brown 10YR 4/2; Silt (ML); nonplastic; slightly cohesive, laminated (shale); moist	Very micaceous
29' bgs	50/5" (SS)	30	As above; noncohesive	Very micaceous

Total Depth (feet)	Water Level (feet)		Logged By:	Drilled/Sampled By:
	After Drilling:	Hours After:	Nick Hanrahan	Brent McDaniel
30	11.10	24	Date Started: 11/10/2015	Date Completed: 11/10/2015

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/04/20 10:01 **COMPLETED** 08/05/20 11:17
WELL LOCATION 560214.93 N 2267090.86 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4795.21 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
▼ **AFTER DRILLING** 4.86 ft / Elev 4790.35 ft
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0						
	SS	75	2-2-4-3 (6)	CL		LEAN CLAY, SILTY, (CL) very dark brown (10YR 2/2), dry to moist, soft, non plastic
1.0				CL		LEAN CLAY, SILTY, (CL) dark yellowish brown (10YR 4/6), moist, soft, low plasticity
2.0	SS	79	3-4-7-9 (11)	CL		LEAN CLAY, SILTY, (CL) light yellowish brown (10YR 6/4), moist, soft, medium plasticity
4.0	MC	63	4-8	CL		LEAN CLAY, SILTY, (CL) yellowish brown (10YR 5/4), moist, medium stiff, medium plasticity
5	SS	92	6-13-21-26 (34)	CL		LEAN CLAY, (CL) yellowish brown with very dark grayish brown (10YR 5/6), moist, stiff, mottled, medium plasticity, recrystallized gypsum and relict shale lamination (shale-derived)
7.0	SS	100	16-24-50 (74)	CL		LEAN CLAY, (CL) grayish brown (10YR 5/2), moist to dry, very stiff, laminated, medium plasticity, iron oxide staining, healed fractures, relict shale structure (shale-derived)
10						
10.0	RC NX	90				SHALE, highly weathered, laminated, dark gray with brownish yellow (10YR 4/1), damp, iron oxide staining, weak with clays along fractures and bedding planes, some vertical to near-vertical fractures present with iron-staining and gypsum recrystallization Sample collected for moisture & permeability
12.0						
15						
15.0	RC NX	83				SHALE, highly weathered, laminated, brown with brownish yellow (10YR 6/6), damp to wet, iron oxide staining, matrix strong, weak along bedding planes and fractures, some near-vertical fractures with iron staining and gypsum recrystallization
20						
20.0	RC NX	100				SHALE, slightly weathered, laminated, dark grayish brown to black (10YR 4/2), damp to wet, iron oxide staining, strong with iron-stained fractures
21.0						SHALE, unweathered, laminated, black (N1), damp, strong, unfractured, gypsum seams, weak clayey zones 25-27 ft
25						
27.0	RC NX	100				SHALE, unweathered, laminated, black (N1), dry, unfractured, gypsum seams
30						
	RC NX	21				
35	RC NX	67				

WELL DIAGRAM
Casing Top Elev: 4797.54 (ft)
Casing Type: 2-in PVC
Bentonite Chips, Hydrated in Lifts
10-20 Silica Sand
0.010-in Slotted Screen

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35						SHALE, unweathered, laminated, black (N1), dry, unfractured, gypsum seams *(continued)*	
40	RC NX	100					Coated Bentonite Pellets
45	RC NX	100					
50	RC NX	100				50.0	

Bottom of borehole at 50.0 feet.

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/05/20 14:25 **COMPLETED** 08/06/20 11:24
WELL LOCATION 559069.18 N 2266856.4 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4802.1 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING --- Dry
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SS	100	13-15-19-20 (34)	CL		LEAN CLAY, SILTY, (CL) pale brown (10YR 6/3), dry, soft to stiff, blocky, non plastic, with fine sand, and gravel
	SS	75	15-14-14-20 (28)			
5	MC	56	17-14			Sample collected for moisture & permeability
						5.0
	SS	100	6-6-7-12 (13)			6.5
	SS	100	8-13-10-12 (23)	ML		SILT, (ML) pale brown (10YR 7/3), dry to moist, soft, with fine sand, loess
10	MC	75	10-6			Sample collected for moisture & permeability
						10.0
	SS	75	11-18-20-18 (38)			WELL GRADED SAND, (SW) light brown to pinkish gray (7.5YR 6/3), well graded, subrounded, fine to coarse grained, moist, loose to medium dense, with gravel
	SS	75	23-24-26-30 (50)			
15	SS	75	16-14-10-7 (24)	SW		
	MC	75				Sample collected for moisture & permeability
						18.0
	SS	67	8-15-17-20 (32)			
20						20.0
	SS	100	19-50	SW		WELL GRADED SAND, CLAYEY, (SW) brown (10YR 5/3), well graded, subangular, fine to coarse grained, moist, medium dense, with gravel, clay component increasing with depth, shale-derived clay in shoe
	SS	33	30-50			
	SS	133	18-50			22.0
25						SHALE, highly weathered, laminated, black with light olive (N1), damp to dry, iron oxide staining, very weak with iron stained zones along bedding planes, no vertical or high-angle fractures
30						30.0
	RC NX	100				SHALE, unweathered, laminated, black (N1), dry, strong
35						

WELL DIAGRAM
Casing Top Elev: 4804.26 (ft)
Casing Type: 2-in PVC
Bentonite Chips, Hydrated in Lifts
10-20 Silica Sand
0.010-in Slotted Screen

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35						SHALE, unweathered, laminated, black (N1), dry, strong *(continued)*	
40	RC NX	90					Coated Bentonite Pellets
45	RC NX	100				Sample collected for moisture & permeability	
50	RC NX	90					
						44.0	
						50.0	

Bottom of borehole at 50.0 feet.

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 08/19/20 10:30 **COMPLETED** 08/19/20 16:00
WELL LOCATION 559069.16 N 2266859.31 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4802.13 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY G. Kelly **CHECKED BY**
▼ **AFTER DRILLING** 54.58 ft / Elev 4747.55 ft Rising; Not Static
NOTES

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0	SS		12-12-14-18 (26)	CL		LEAN CLAY, (CL) light brown (7.5YR 6/4), dry, stiff, with sand, and gravel
	SS		17-11-12-17 (23)			
5	SS		18-12-9-8 (21)			
						6.0
	SS		5-5-7-9 (12)	ML		SILT, (ML) light brown (7.5YR 6/4), dry, loess
	SS		10-14-8-8 (22)			
10						9.5
	SS		13-20-17-14 (37)	SW		WELL GRADED SAND, (SW) brown to dark yellowish brown (10YR 5/3), well graded, fine to coarse grained, moist, loose, with gravel
	SS		11-12-22-32 (34)			
15	SS		11-15-12-11 (27)			
	SS		22-17-16-12 (33)			
	SS		11-14-22-13 (36)			19.0
20	SS		28-30-50 (80)	SW		CLAYEY SAND, (SW) yellowish brown (10YR 5/4), moist, dense, with gravel
						22.0
	SS		50			SHALE, moderately weathered, dark yellowish brown (10YR 2/2), damp, weak, blocky
	SS		50			
25						
	SS		50			
	SS		50			
30						30.0
	RC NX					SHALE, unweathered, brownish black (5YR 2/1), dry, strong, unfractued, weak zones at 42'7" to 42'10" and 43' 9" to 43' 10"
35						

WELL DIAGRAM
Casing Top Elev: 4804.46 (ft)
Casing Type: 2-in PVC
Bentonite Chips, Hydrated in Lifts

(Continued Next Page)

CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35							
40	RC NX					SHALE, unweathered, brownish black (5YR 2/1), dry, strong, unfractued, weak zones at 42'7" to 42'10" and 43' 9" to 43' 10" *(continued)*	
45	RC NX						10-20 Silica Sand 0.010-in Slotted Screen
50	RC NX						
55	RC NX					55.0 ▼	

Bottom of borehole at 55.0 feet.

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CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DATE STARTED 12/03/20 11:53 **COMPLETED** 12/04/20 15:00 **WELL LOCATION** 559642.055 N 2267090.86 E

DRILLING CONTRACTOR Dakota Drilling **GROUND ELEVATION** 4800 ft **HOLE DIAMETER** 8

DRILLING METHOD HSA/AR **GROUND WATER LEVELS:**

LOGGED BY E. Munoz **CHECKED BY** ▼ **AFTER DRILLING** 33.31 ft / Elev 4766.69 ft

NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0							Casing Type: 2-in PVC
	AU			OL		SILT (OL), dark grayish brown (10YR 3/2), soft, non plastic, dry, rootlets in upper 0.5ft (Topsoil)	
						2.0	
5				CL		SILTY LEAN CLAY (CL), yellowish brown (10YR 5/4), medium stiff, low plasticity, dry, evaporites present (calcite, gypsum) (Colluvium)	
	CC	67				6.0	
				SM		CLAYEY SAND SILTY SAND (SM), yellowish brown (10YR 5/4), dense, dry, evaporites present (calcite, gypsum) (Alluvium) (samples W-9-5-6 & W-9-7-8)	
10						8.5	
	CC	33		SW		WELL GRADED SAND (SW), yellowish brown (10YR 5/6), loose, moist, fine to coarse grained with fine to coarse gravel (up to 2"), sub-rounded to rounded (Alluvium) (W-9-11-12)	Bentonite Chips
15						15.0	
	CC	60		ML		CLAYEY SILT (ML), yellowish brown (10YR 5/4), soft, low plasticity, moist, (W-9-15-16)	
						17.0	
20				SW		WELL GRADED SAND (SW), yellowish brown (10YR 5/6), loose, moist to wet, fine to coarse grained with fine to coarse gravel (up to 2"), sub-rounded to rounded (Alluvium) (W-9-21-22) (water added to drill clay, below)	
	CC	67				22.0	
				CL		LEAN CLAY (CL), brownish yellow (10YR 6/6), stiff, low plasticity, moist, blocky with some relict shale structure (Colluvium) (W-9-22-23)	
25						25.0	
	CC	100		CL		LEAN CLAY (CL), yellowish brown with dark grayish brown (10YR 5/6), medium stiff, low plasticity, moist to wet, shale fragments & gypsum present (water added to drill) (Colluvium) (W-9-26-27)	
						27.0	
30						SHALE, highly weathered, laminated, very dark grayish brown (10YR 3/2), dry to low moist, weak, clayey, gypsum and iron-staining along fractures and bedding planes (water added to drill) (Weathered Shale)	
						30.0	
	CC	100				SHALE, moderately weathered, laminated, black (Gley 1 2.5/N), weak to medium-strong, fissile/friable, iron staining and gypsum along bedding planes and fractures, high angle fracture 32-33ft, moist to wet (water added to drill) (Weathered Shale) (W-9-33-34)	0.010-in Slot
35						35.0	

(Continued Next Page)

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CLIENT Xcel Energy **PROJECT NAME** Comanche Station

PROJECT NUMBER 10217175 **PROJECT LOCATION** Pueblo, CO

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
35							
	CC	100				SHALE, moderately weathered to slightly weathered, laminated, black (Gley 1 2.5/N), weak, clayey, moist, no fractures or iron staining (Weathered Shale)	
						38.0	
40						SHALE, slightly weathered to unweathered, laminated, dark gray (Gley 1 4/N), moderately strong to strong, dry, no fractures or staining (Unweathered Shale) (W-9-44-45)	
	CC	100					
45						45.0	

Bottom of borehole at 45.0 feet.

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W-10A

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 12/08/20 09:25 **COMPLETED** 12/08/20 11:00
WELL LOCATION 562453.84 N 2266883.73 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4834 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING ---
NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0							Casing Type: 2-in PVC
				SM		SILTY SAND (SM), very dark grayish brown (10YR 3/2), loose, dry, fine grained, some coarse sand (Fill)	
						1.0	
				ML		SILT (ML), yellowish brown (10YR 5/4), soft, low plasticity, dry, with fine sand (Colluvium) (W-10-2.5)	Bentonite Chips
5						5.0	
				SC		CLAYEY SAND (SC), light yellowish brown (10YR 6/4), medium dense, dry, fine grained, grades into silty clay with fine sand, mottled with evaporites (Colluvium) (W-10-5)	
						7.5	
10				CH		FAT CLAY (CH), light yellowish brown (10YR 6/4), stiff to very stiff, medium plasticity, dry, with very dark gray (10YR 3/1) shale fragments, recrystallized evaporites on high-angle fractures, rig grinding/auger sticking in clay (Colluvium) (W-10-7.5, W-10-10, W-10-12.5)	10/20 Silica Sand 0.010-in Slot
15						15.5	
				CL		LEAN CLAY (CL), light yellowish brown (10YR 6/4), stiff, low plasticity, dry, with fine sand and very dark gray (10YR 3/1) shale fragments, recrystallized evaporites on high-angle fractures (Colluvium) (W-10-15)	
						17.5	

Bottom of borehole at 18.0 feet.

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W-10B

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 12/07/20 10:05 **COMPLETED** 12/08/20 09:25
WELL LOCATION 562456.84 N 2266963.73 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4837 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING 25.47 ft / Elev 4811.53 ft
NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				SM		SILTY SAND (SM), very dark grayish brown (10YR 3/2), loose, dry, fine grained, some coarse sand (Fill)
1.0						SILT (ML), yellowish brown (10YR 5/4), soft, low plasticity, dry, with fine sand (Colluvium) (W-10-2.5)
	MC	83	4-5	ML		
5						
5.0	MC	83	11-15	SC		CLAYEY SAND (SC), light yellowish brown (10YR 6/4), medium dense, dry, fine grained, grades into silty clay with fine sand, mottled with evaporites (Colluvium) (W-10-5)
7.5	MC	91	22-28/5"	CH		FAT CLAY (CH), light yellowish brown (10YR 6/4), stiff to very stiff, medium plasticity, dry, with very dark gray (10YR 3/1) shale fragments, recrystallized evaporites on high-angle fractures, rig grinding/auger sticking in clay (Colluvium) (W-10-7.5, W-10-10, W-10-12.5)
10	MC	89	21-29/3"			
	MC	100	30-20/3"			
15						
15.5	MC	91	23-27/5"	CL		LEAN CLAY (CL), light yellowish brown (10YR 6/4), stiff, low plasticity, dry, with fine sand and very dark gray (10YR 3/1) shale fragments, recrystallized evaporites on high-angle fractures (Colluvium) (W-10-15)
17.5	MC	100	38-12/1"			SHALE, highly weathered, very dark gray (10YR 3/1), weak, friable, clayey, fractured with evaporites and iron staining (Weathered Shale) (W-10-17.5)
20						
20.0	MC	100	50			SHALE, moderately weathered, very dark gray (10YR 3/1), medium strong, dry, iron stained with trace evaporites (Weathered Shale) (W-10-20)
20.5	NX	100				SHALE, moderately weathered, dark grayish brown (10YR 4/2), medium strong, dry, fractured with iron staining and evaporite depositis (Weathered Shale) (W-10-20-25 [SPLP])
25						
25.0	NX	75				SHALE, moderately weathered to highly weathered, very dark gray (10YR 3/1), weak, clayey, moist to wet, highly fractured, iron stained (Weathered Shale)
29.0						
30						SHALE, slightly weathered, dark gray (Gley 1 4/N), weak, clayey, moist, unfractured (Weathered Shale)
31.0	NX	100				SHALE, unweathered, dark gray (Gley 1 4/N), strong, unfractured (Unweathered Shale) (W-10-32-34 [SPLP])
34.0						

WELL DIAGRAM

Casing Type: 2-in PVC

Bottom of borehole at 34.0 feet.

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W-11

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 12/08/20 12:15 **COMPLETED** 12/09/20 11:00
WELL LOCATION 558644.6073 N 2264830.955 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4775 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
▼ **AFTER DRILLING** 20.95 ft / Elev 4754.05 ft
NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				ML		SILT (ML), yellowish brown (10YR 5/4), soft, non plastic, dry, with fine sand, trace coarse sand and subrounded fine gravel, rootlets (Topsoil)
1.0				ML		CLAYEY SILT (ML), yellowish brown (10YR 6/4), soft, low plasticity, dry, (Colluvium)
5	AU					
5.0						SHALE, moderately weathered to highly weathered, dark gray (Gley 1 4/N) with yellowish brown (10YR 5/6) iron-staining, weak, clayey, dry to low moist, moist after 24 ft, high-angle to vertical fractures, evaporites (particularly gypsum) (Weathered Shale) (W-11-9-10)
10	CC	100				
15	CC	100				
	NX	79				
20	NX	0				
25	NX	25				
	NX	0				
	NX	75				
30	NX	50				
33.5						SHALE, unweathered, very dark gray (10YR 3/1) to black (Gley 1 2.5/N), strong, unfractured (except coring-induced), dry to low moist (Unweathered Shale) (W-11-38-39)
35	NX	100				
39.0						

WELL DIAGRAM

Casing Type: 2-in PVC

Bentonite Chips

10/20 Silica Sand
0.010-in Slot

Bentonite Pellets

Bottom of borehole at 39.0 feet.

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Englewood, CO 80112

W-12

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 12/09/20 11:20 **COMPLETED** 12/09/20 14:45
WELL LOCATION 558582.6073 N 2265536.955 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4777 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY**
AFTER DRILLING 19.52 ft / Elev 4757.48 ft
NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				ML		0.5 SILT (ML), yellowish brown (10YR 5/4), soft, non plastic, dry, with fine sand, trace coarse sand and subrounded fine gravel, rootlets (Topsoil)
	AU			ML		CLAYEY SILT (ML), yellowish brown (10YR 6/4), soft, low plasticity, dry, (Colluvium)
						4.0
5				CH		FAT CLAY (CH), brownish yellow (10YR 6/8), very stiff, medium plasticity, dry, trace coarse sand in upper 2ft, evaporites throughout (Colluvium) (W-12-5-6)
	CC	100				
10						10.5
				CL		LEAN CLAY (CL), pale brown (10YR 6/3), stiff, low plasticity, dry, relict shale structure, evaporites (gypsum) (Colluvium) (W-12-11-12)
	CC	90				12.0
15						SHALE, dark gray (10YR 4/1) and yellowish brown (10YR 5/4), moderately to highly weathered, weak, clayey, many high-angle fractures with iron staining and gypsum deposits, some pyrolusite, dry to moist/wet at 19ft (Weathered Shale) (W-12-13-14)
	NX	13				
20						
	NX	80				
						23.0
25						SHALE, black (2.5Y 2.5/1 to Gley 1 2.5/N), slightly weathered, strong, moist to low moist, some clayey zones, some high angle fractures, iron staining, gypsum (Weathered Shale)
						26.0
	NX	100				SHALE, black (Gley 1 2.5/N), unweathered, strong, unfractured (except coring-induced), no staining or clayey zones present, low moist to dry (Unweathered Shale)
						29.0

WELL DIAGRAM

Casing Type: 2-in PVC

Bentonite Chips

10/20 Silica Sand
0.010-in Slot

Bentonite Pellets

Bottom of borehole at 29.0 feet.

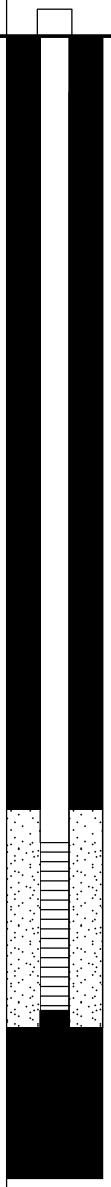
HDR, Inc.
9781 S Meridian Blvd, Suite 400
Englewood, CO 80112

W-13

CLIENT Xcel Energy
PROJECT NAME Comanche Station
PROJECT NUMBER 10217175
PROJECT LOCATION Pueblo, CO
DATE STARTED 12/10/20 08:15 **COMPLETED** 12/10/20 12:00
WELL LOCATION 558722.5789 N 2266105.628 E
DRILLING CONTRACTOR Dakota Drilling
GROUND ELEVATION 4801 ft **HOLE DIAMETER** 8
DRILLING METHOD HSA/NX/AR
GROUND WATER LEVELS:
LOGGED BY E. Munoz **CHECKED BY** ---
AFTER DRILLING ---
NOTES New, XYZ estimated pending survey

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0				ML		1.0 SILT (ML), yellowish brown (10YR 5/4), soft, non plastic, dry, with fine sand, trace coarse sand and subrounded fine gravel, rootlets (Topsoil)
5	AU			ML		SILT (ML), light yellowish brown (10YR 6/4), soft, non plastic, dry, some fine sand 7-8.5ft (Loess) (W-13-4-5)
10	CC	30				8.5
15	CC	20		SW		WELL GRADED SAND WITH GRAVEL (SW), reddish brown (5YR 5/4), loose, moist, fine to coarse grained, subrounded to rounded, gravel up to 2in, 1in lens of caliche-cemented alluvium at 17ft (Alluvium) (W-13-10-11)
20	CC	33		CL		17.0 SILTY LEAN CLAY (CL), yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4), stiff to very stiff, low plasticity, moist, relict shale structure, shaly component increases with depth, lenses of fat clay 21.5-22ft (Colluvium)
25	CC	80				23.0 SHALE, black (10YR 2/1) with yellowish brown (10YR 5/4) clays and brownish yellow (10YR 6/8) iron staining, highly weathered, weak, clayey, moist to wet at 25ft, fractured, gypsum present (Weathered Shale) (W-13-23-25)
30	NX	63				27.5 SHALE, black (7.5YR 2.5/1), slightly weathered, strong, moist, some clays and inron staining along bedding planes, no high angle fractures, gypsum present (Weathered Shale) 29.0
35	NX	100				SHALE, black (10YR 2.5/1), unweathered, strong, moist, unfractured (except coring-induced) (Unweathered Shale) 34.0

WELL DIAGRAM



Bottom of borehole at 39.0 feet.